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# Investigation of Argon Seeding in Different Divertor Configurations in EAST and Corresponding SOLPS 5.0 Modeling

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Introducing external impurities into plasma provides an effective means to reduce divertor power load for present and future fusion devices [1]. Dedicated argon (Ar) seeding experiments focusing on the effects of the plasma configuration and seeding position have been carried out in EAST, with the corresponding simulations using SOLPS 5.0 code package being also ongoing.
The double null (DN) divertor configuration is found to have a cooler divertor plasma before Ar seeding comparing to lower single null (LSN), as expected [2]. When Ar is seeded, the parallel heat flux to the lower divertor, measured by target Langmuir probes, exhibits a slightly more dramatic decrease in the case of DN configuration than in LSN configuration. At the outer midplane, the measurements by reciprocating probe reveal that the electron temperature and density are higher in DN configuration than in LSN configuration after Ar seeding. This indicates a greater gradient of temperature along the field line in DN case, which is beneficial for reducing divertor power load. In addition, the plasma stored energy Wdia increase with Ar seeding in DN case, meaning the confinement is improved.
Comparisons have also been made between Ar puffing into the divertor volume in LSN configuration and into main chamber in USN configuration. The radiation in the latter case increases by 42.6% together with a significant increase in Zeff, while in both cases the plasma stored energy almost stays unchanged. Though electron temperature and density at midplane is higher, the parallel heat flux at divertor plate is lower in USN case. However, after Ar seeding no decrease in parallel heat flux to upper outer divertor plate is seen in this case. At inner plate only the peak value of parallel heat flux reduces by 13%. It is evident that Ar can readily penetrate into the core when it is puffed into the main chamber volume, but does not affect the heat flux to the divertor very much in this case. we will include cases of different Ar puff locations as well as cases of Ar seeding in different plasma configurations in the SOLPS simulation to compare with present and further experiment results.

[1] ITER Physics Basis 1999 Nucl. Fusion 39 2208
[2] S.C. Liu et al. Phys. Plasmas 21, 022509 (2014)

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